Putting Innovative Building Technologies to the Test

GSA's Green Proving Ground Program

Kevin Powell, GPG Program Manager, 09.30.14

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Green Proving Ground Program

The Innovation Lever

GPG Overview

GPG leverages GSA's real estate portfolio to evaluate innovative technologies in order to accelerate GSA's sustainability goals, reduce operational costs and lead market transformation.

Established in October, 2010

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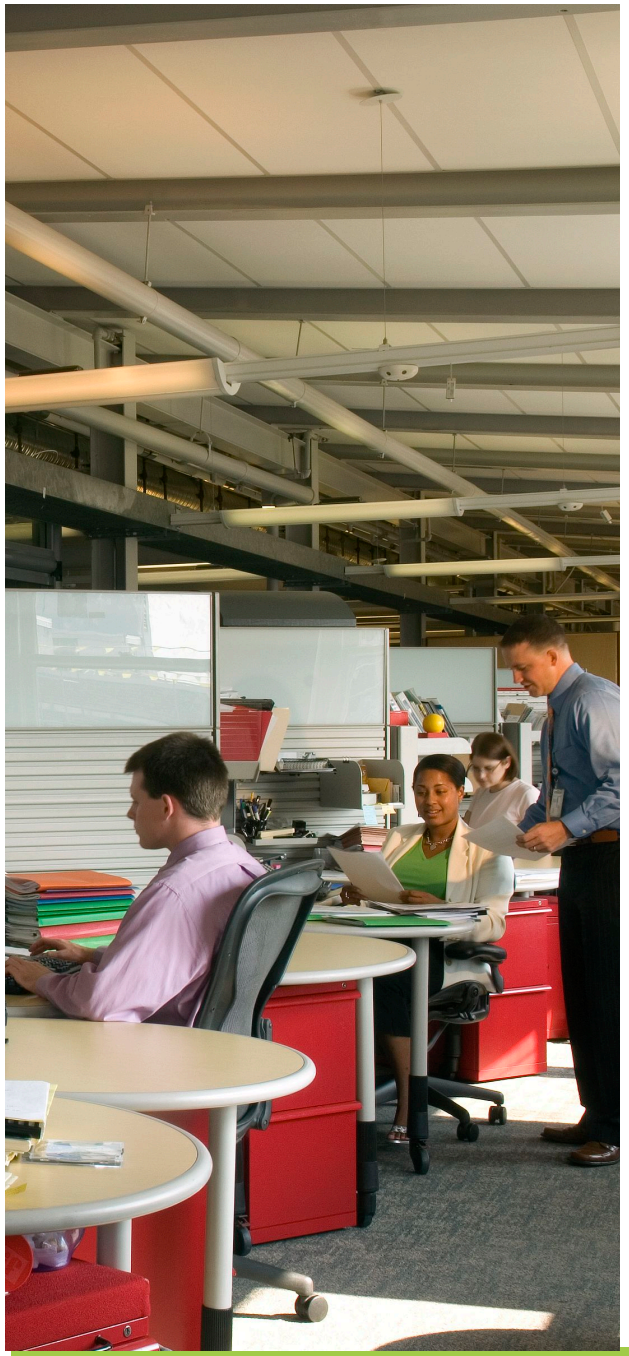
Agenda

- What is the GPG Program
- What kinds of technologies is GPG looking for?
- What are program outcomes?
- What is the M&V process?
- How to complete the RFI



Owned and Leased Assets

9,011

378 million

RSF across the US

1.1 million

Federal employees

41%

More efficient than typical commercial building

GSA Targets

30%
Reduction in Energy Use Intensity, by 2015

26%
Reduction in Water Use Intensity, by 2020

28%
Reduction in Scope 1 and 2 GHGs, by 2020

Net Zero
All capital project designs starting 2020
Achieve net zero by 2030

Executive Order 13514, 2009
Energy Independence and Security Act, 2007
MOU on High Performance and Sustainable Buildings, 2006
Energy Policy Act, 2005
www.wbdg.org/references/federal_mandates.php

Green Proving Ground

Program Objectives

Innovative building technologies are evaluated in the real world operating environment of GSA's real estate portfolio. Successful technologies:

- Increase environmental performance
- Decrease operational costs
- Improve tenant satisfaction
- Have potential to transform markets through limited or broad deployment

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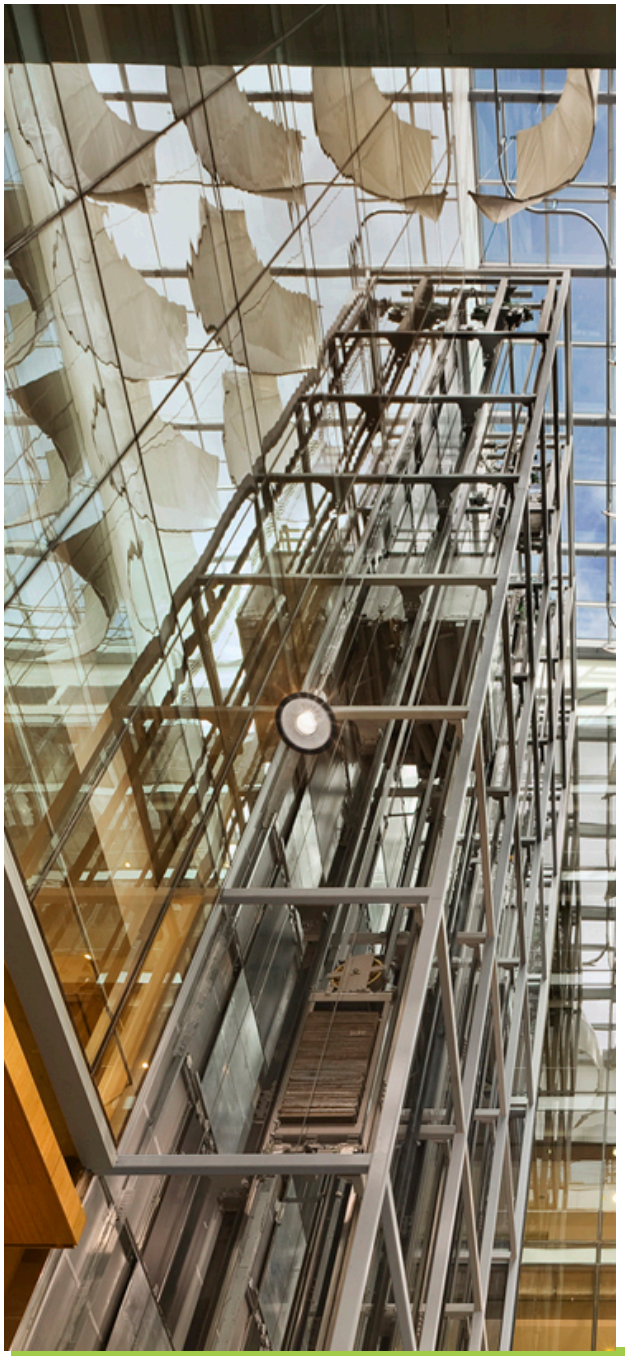

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How Does it Work?

2 years

1. Technology selection
2. Test-bed site selection
3. Project plan
4. Test-bed installation
5. Test-bed evaluation
6. Report publication with deployment recommendation

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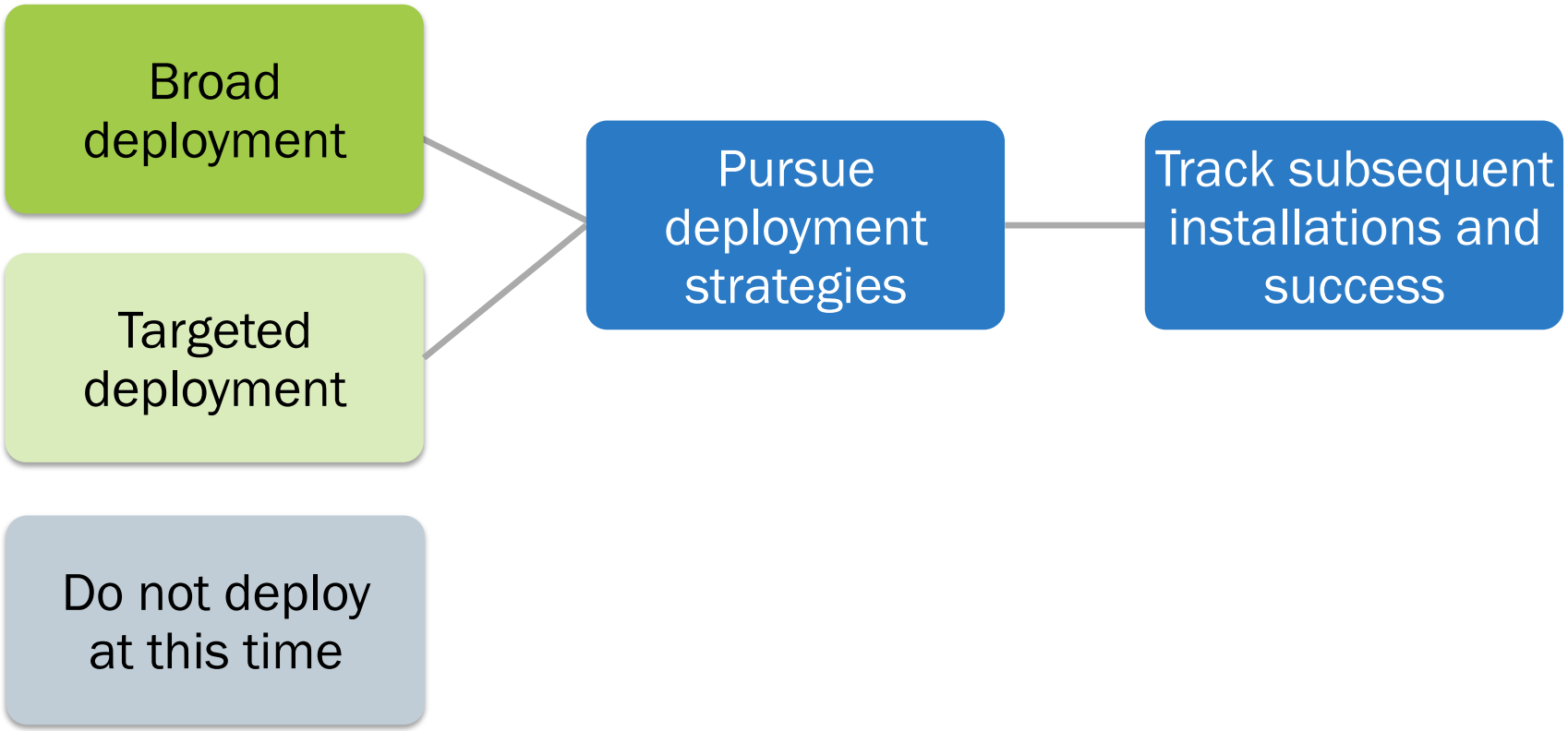
Deployment Recommendations



Green Proving Ground

Deployment of “Proven” Technologies

Replace at End of Life

Next time this equipment needs to be replaced, invest in this technology instead

Retrofit

Introduce technologies that immediately improve performance

New Construction

Choose the best in class performance and payback, from the beginning

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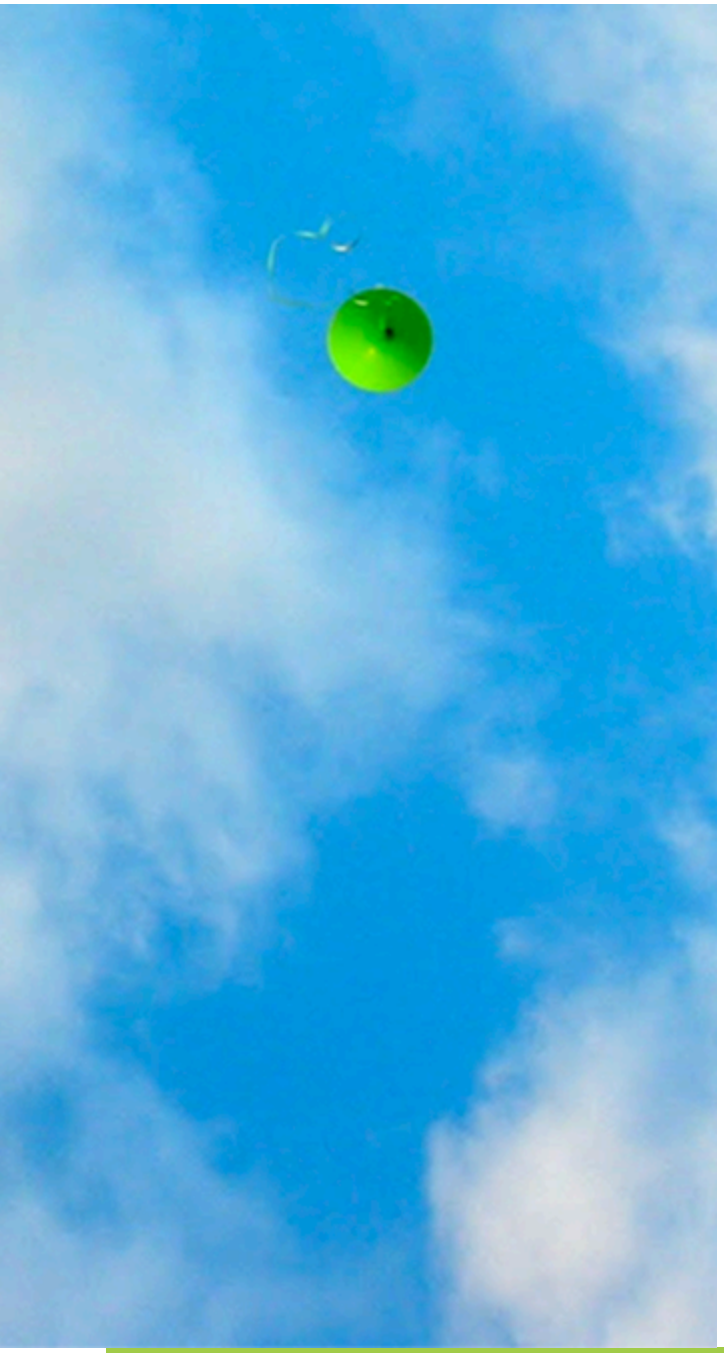
Opportunities and Drivers

GSA Portfolio

- Large urban buildings with central plant
  - 90% buildings over 100,000 square feet
  - 80% portfolio energy spend: buildings > 200k square feet
- Majority in mild climate zone
  - More than 80% in ASHRAE climate zones 3, 4, 5
- Energy efficient
  - Majority Energy Star 80 or better
- “Smart Buildings” infrastructure
  - Smart meters and national BMS for 200 most energy intensive facilities
  - Big data: GSA Link logs 15 million data points / day



GPG Technologies

Opportunity

Currently

$331 million/yr energy costs

$3/sqft operations & maintenance

What are We Looking for?

Technology Types

EFFICIENT COMPONENTS	ASSESSMENT & DESIGN TOOLS	OPTIMIZED OPERATIONS	SUPPLY & DEMAND INTEGRATION
• Lighting • HVAC • Building Envelope • Water	• Auditing & benchmarking • Meters and sensors • Retrofit design tools	• Information & management systems • Behavioral interventions • Energy management	• On-site generation & storage • Demand response & ancillary services • Microgrid

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What are We Looking for?

Technology Maturity

PRE-COMMERCIAL ⟷ EARLY COMMERCIAL		
Translation	**Adoption**	**Diffusion**
Pre-commercial technology — real-world demonstration needed	*Emerging technology*— support & distribution partnerships needed	*Defined commercial technology with sub-optimal market penetration* — greater market exposure needed

HIGH < RISKS/BENEFITS > LOW

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GPG Technology Evaluations

Completed

BUILDING ENVELOPE

- Vacuum Insulated Panels, 03.14
- Chromogenic Windows, 03.14
- High R Value Windows, 12.13

ENERGY MANAGEMENT

- Plug Load Control, 09.12
- Wireless Sensor Networks, 03.12

LIGHTING

- Integrated Daylighting Systems, 07.14
- Occupant Responsive Lighting, 09.12

HVAC

- Wood-Pellet-Fired Biomass Boiler, 06.14
- Indirect Evaporative Cooler, 03.14
- Synchronous & Cogged Fan Belts, 03.14
- Variable Speed Mag-Lev Chiller, 12.13
- Variable Refrigerant Flow, 12.13
- Condensing Boilers, 12.12

ON-SITE ENERGY CONSUMPTION

- PV Guidance, 12.13
- Photovoltaics, 12.12

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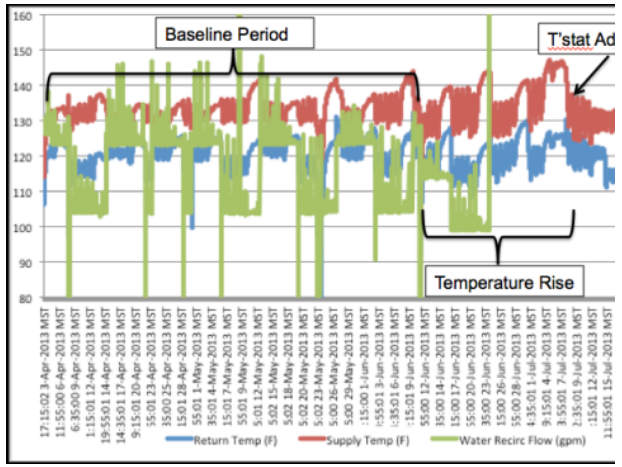
GPG Technology Evaluations

Ongoing



BUILDING ENVELOPE

- EC Windows with Dynamic Controls
- Glazing Retrofit Coating
- Low-E Window Film

ENERGY MANAGEMENT

- Central Plant Optimization Strategies
- Passive Thermal Storage Platform
- Predictive HVAC Optimization
- Socially Driven HVAC
- Virtual Energy Audit

WATER

- Non-Chemical Water Treatment
- Wireless Moisture Sensing Irrigation
- BAS Integrated Weather Station Irrigation

HVAC

- High efficiency RTU
- Modular Absorption Chiller
- Variable Speed Screw Chiller
- Wireless Pneumatic Thermostat

LIGHTING

- LED Replacement Lamp
- LED Retrofit Luminaire
- Networked Lighting
- Wireless Lighting Control Systems

ON-SITE ENERGY GENERATION & STORAGE

- Honeycomb Solar Thermal Collector
- PV with Solar Water Heating

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Energy Management : Translation

Wireless Network Sensors

- Dense network of wireless sensors provides real-time information enabling facility operator to better manage HVAC.
- 48% reduction in facility cooling load
- 3.4 years simple payback (@ $0.045 kWh < 50% of national average $0.11 kWh)
- Deploying at two GSA-operated data centers
- On GSA Schedule

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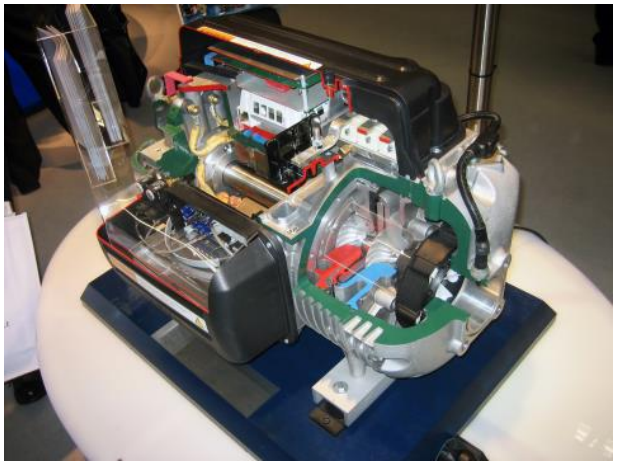
HVAC : Adoption

Maglev Chillers



- Eliminate heat, noise and vibration with magnetic levitation and improve efficiency with variable speed drive
- Quiet performance allows chillers to be placed closer to occupant spaces
- 42% energy savings, < 5 year payback
- Deploy as end-of-life replacement for rotary screw chillers
- 39 sites installed, 21 pending

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Energy Management : Adoption

Advanced Power Strips

- Schedule-based control, where users determine the day and time when a circuit is energized, found to be most effective.
- 26% energy reduction at workstations with advanced computer management already in place, 50% energy reduction in kitchens and printer rooms
- Over 16,000 units deployed at 80 federal facilities across the country
- On GSA Schedule

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HVAC : Diffusion

Condensing Boilers

- Capture heat that is lost through steam in conventional boilers
- Energy savings at 6 locations averaged 22%
- Life-cycle cost-effective when only 3%-5% more efficient than high-efficiency boiler
- Key to savings is return-water temperature below 130 degrees
- Deploy as end-of-life replacement for conventional boilers where return water temperature < 130 is possible
- 62 sites installed, 9 pending

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Your contribution

Technology

- Amount to be determined by what is deemed necessary to make a deployment recommendation, and what is reasonable for the vendor. Sample products as requested for demonstrations.

Time and travel

- Provide input on site selection, test bed design, and project plan
- Provide guidance on installation, commissioning, and tenant engagement
- Travel to on-site meetings
- Provide input on evaluation report

Green Proving Ground RFI FY2015

Selection Criteria

Factors GPG considers in the RFI:

- Innovation (twice as important as other factors)
- Improve Environmental Performance in Federal Buildings
- Deployment potential
- Project Value
- Technical Risk

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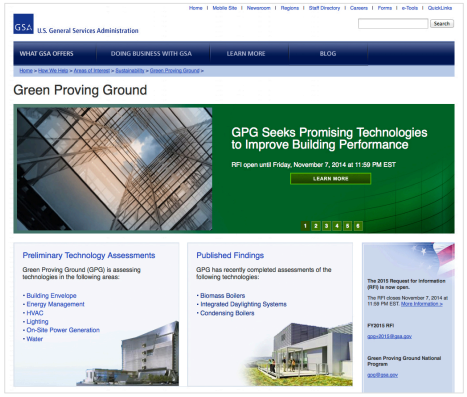
Green Proving Ground RFI FY2015

How Do I Apply?

Learn about GPG

gsa.gov/gpg

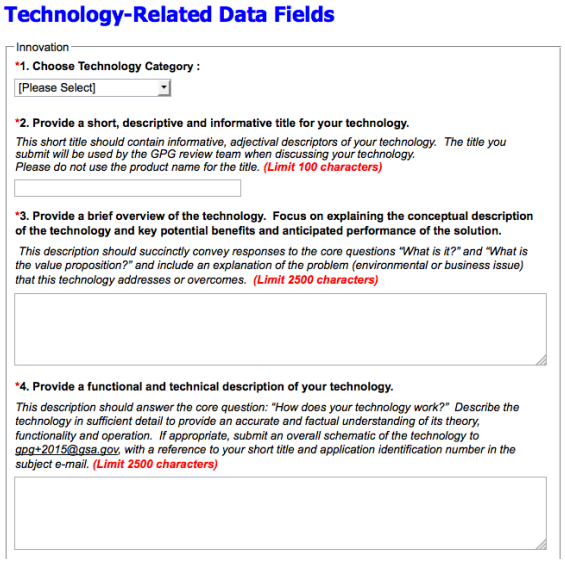


Review RFI

http://goo.gl/2nBa7P

Complete RFI Webform

http://goo.gl/bipQ5H



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Questions?

Review the RFI at FedBizOpps: http://goo.gl/2nBa7P

Green Proving Ground Program
gpg+2015@gsa.gov

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